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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Patent Application of

N. KOFUJI et al.

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| Serial No. | 09/363,191 | Group Art Unit: 1763 |
| Filed: | July 29, 1999 | Examiner: L.L. Alejandro Mulero |
| For: | DRY ETCHING APPARATUS AND A METHOD OF MANUFACTURING A SEMICONDUCTOR DEVICE | |
| Customer No.: | 24956 | |

**TRANSMITTAL OF PREVIOUSLY FILED APPEAL BRIEF**

**Mail Stop: Appeal Brief - Patents**
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

October 6, 2005

Sir:

Appellants filed an Appeal Brief in the above-identified application on October 6, 2005, copy enclosed. Also enclosed is a mail room date-stamped copy of the filing receipt.

An erroneous heading on the paper of the originally filed Appeal Brief caused the Appeal Brief to be associated with another one of the Assignee's applications, application serial no. 10/443,875. The heading has been corrected.

If any further fees are due in connection with the filing of this Paper, including any Extension of Time fees that are necessary, the Commissioner is hereby authorized to charge deposit Account No. 50-1417 (H-811).

Respectfully submitted,

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**October 6, 2005** **H-811**

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In re Patent Application of

N. KOFUJI et al .

Serial No. 09/363,191 Group Art Unit: 1763

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For: DRY ETCHING APPARATUS AND A METHOD OF MANUFACTURING A SEMICONDUCTOR DEVICE



Papers Filed Herewith:

**FEE TRANSMITTAL;**
**PETITION FOR EXTENSION OF TIME;**
**AMENDMENT;**
**APPEAL BRIEF; and**
**CREDIT CARD PAYMENT FORM in the amount of $950.00 for payment of 2-mth extension fee and appeal brief filing fee.**

Receipt is hereby acknowledged of the papers filed, as identified in connection with the above-identified patent application.

COMMISSIONER OF PATENTS AND TRADEMARKS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of

M. UTAMURA

Serial No. 10/443,875 Group Art Unit: 3746

Filed: May 23, 2003 Examiner: Charles G. Freay

For: GAS TURBINE, COMBINED CYCLE PLANT AND COMPRESSOR

**APPEAL BRIEF**

Commissioner for Patents
Mail Stop Appeal Brief - Patents
P.O. Box 1450
Alexandria, VA 22313-1450

October 6, 2005

Sir:

This appeal is taken from the final rejection of claims 1, 2, 4, 6, 8, 9, and 34-40 set forth in the Final Office Action dated December 6, 2004. In accordance with 37 CFR §41.37, the Appellant addresses the following items.

## 1. REAL PARTY IN INTEREST

The real party in interest of this application is the assignee, Hitachi, Ltd.

## 2. RELATED APPEALS AND INTERFERENCE

It is believed that there are no related appeals or interferences that will directly affect, be directly affected by, or have a bearing on the Board's decision in this appeal.

## 3. STATUS OF CLAIMS

Claims 1, 2, 4, 6, 8, 9 and 34-40 are pending in this application and are on appeal. The claims on appeal stand rejected in the Final Office Action of December 6, 2004. A copy of claims 1, 2, 4, 6, 8, 9 and 34-40 is attached as pages A-1 - A-6 of the Claims Appendix and includes amendments made to claims 39 and 40 in the Amendment filed concurrently herewith.

## 4. STATUS OF AMENDMENTS

One Amendment has been filed subsequent to the final rejection of December 6, 2004. The one Amendment is filed concurrently herewith and adopts changes to claims 39 and 40 suggested by the Examiner to overcome a 35 U.S.C. § 112, second paragraph rejection.

## 5. SUMMARY OF THE INVENTION

The present invention as defined in the claims on appeal is directed to a dry etching apparatus, and in particular to an effective magnetic field plasma generator (Fig. 1) which makes the in-plane distribution of ion current density and

etching rate uniform with respect to a sample 8 that is supported on a holder or support 7. As shown in Fig. 1, the sample 8 is in a vacuum chamber and there is a reactive gas supplied from shower plates 9 arranged to face the sample 8. The plasma is formed by ECR resonance (electron cyclotron resonance) of electromagnetic waves which the antenna (MSA 4, Fig. 1) radiates by supplying the MSA through a separation board 10 from outside the vacuum chamber with UHF waves of not less than 300MHz and not more than 1GHz (*see*, page 3, lines 23-29 of the specification) using a magnetic field formed by solenoidal coils 5, 6. *See*, Page 6, line 4-14 of the specification. Since UHF waves are used, the wavelength becomes substantially equivalent to the chamber diameter, and only the plasma of a single mode (TM01) can exist. *See* page 2, lines 31-33 of the specification. Therefore, there is no instability of the plasma by the transposition between modes, as there is in the prior art. The generation of the high-density plasma by an intense electric field at the edge of the discoidal electrode by the near field is suppressed since the MSA 4 is on the atmosphere side of the dielectric (the separation board 10) which divides the vacuum chamber side and the atmosphere side.

Independent Claim 1

Independent claim 1 is directed to a dry etching apparatus for treating a body, such as sample 8, in a chamber

having a sample holder 7 designated to hold a sample with a predetermined diameter (Fig. 1). The gas is introduced into the chamber (gas introducing means) by shower plate 9. A vacuum is created in the chamber (means for exhausting gas in the chamber). The ultra high frequency is supplied (labeled in Fig. 1) through the cone shaped feed division 11, which is in contact with discoidal electrode 3. See page 6, lines 6-9 and 20-31 of the specification. An electromagnetic wave radiation antenna (MSA 4) is coupled with a power supply and installed on the atmosphere side of the separation plate 10, which is a dielectric between the antenna and the inside of the chamber. A quartz disk is used as the separation plate 10 (See page 5, lines 30-31).

The antenna is claimed to be a plate antenna including a discoidal electrode 3 to which the UHF is applied, an earth electrode 1 and a dielectric plate 2 provided between the discoidal electrode 3 and the earth electrode 1. Applicants explain the basic structure of a micro strip antenna (MSA) comprising the grounded discoidal electrode 1, dielectric 2 and high frequency discoidal electrode 3 with reference to Fig. 2, which is of the prior art as demonstrated by Japan laid-open publication no. 8-337887. By inspection of Fig. 1, the diameter of the discoidal electrode 3 is not less than that of the wafer that is supported on the sample holder 8. Further, page 6, lines 27-30 of the specification state that the discoidal electrode 3 is preferably 255 mm and the wafer

is disclosed as being 200 mm, as taken form the dimensions of the wafer shown in Figs. 9, 13 and 15. That is, the scale of the wafer with respect to the axis at the 0 position extends from -100 mm to +100 mm. Accordingly, the diameter of the discoidal electrode (3) is not less than that of the wafer (8).

Independent Claim 34

Claim 34 is supported in the same manner by the specification and drawings of the application as originally filed as set forth with respect to claim 1.

Dependent Claim 8

Claim 8 sets forth in combination that the plate antenna resonates in TM01 mode. See page 6, line 24 of the specification. In full, claim 8 includes that the separation plate (10) separates the chamber to provide a second area (above the plate) where the pressure is higher than the pressure in the (vacuum) chamber and that the antenna is a microstrip antenna (MSA 4) formed in the second area.

Dependent Claims 9 and 37-38

Claim 9 sets forth that the power feed of the UHF to the plate antenna is in the form of a cone. *See* feed division 11 in Fig. 1 and the description on page 6, lines 30-33 of the specification. Feed division 11 is conical-shaped and is

described as being in contact with discoidal electrode 3. The electromagnetic wave radiation antenna (MSA 4) is coupled with is installed on the atmosphere side of the separation plate 10, which is a dielectric between the antenna and the inside of the chamber, which is in a vacuum. Solenoidal coils 5, 6 are outside the chamber. *See*, Page 6, lines 4-14 of the specification.

Dependent Claims 39 and 40

Claim 39 sets forth that the gas shower plate has a diameter less than or equal to ¾ of the diameter of the wafer. See page 11, lines 15-20 of the specification for support. Claim 40 finds support in the same manner.

## 6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The following grounds of rejection are outstanding:

A. Claims 1-2, 4, 6, 8-9, 34 and 34-38 stand rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement.

B. Claims 1-2, 4, 6, 8 and 34-36 are rejected as being unpatentable under 35 U.S.C. §103(a) over Yokogawa et al. EP 0,779,644A2.

C. Claims 9 and 37-38 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Yokogawa et al. in view of Nakano et al., U.S. Patent No. 6,155,202.

D. Claims 39 and 40 stand rejected under 35 U.S.C. §103 as being unpatentable over Yokogawa et al. in view of

Lee et al., U.S. Patent No. 6,009,830 or Fairburn et al., U.S. Patent No. 5,614,055

## 7. ARGUMENT

### GROUND OF REJECTION A

Claims 1-2, 4, 6, 8-9, 34 and 34-38 stand rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. The Examiner rejects these claims by asserting that they contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. In particular, the Examiner states that the specification as originally filed fails to provide support for the instant claimed invention of a dry etching apparatus wherein the antenna includes a discoidal electrode to which ultra high frequency is applied, an earth electrode and a dielectric plate provided between the discoidal electrode and the earth electrode. See page 2, lines 12-16 of the Office Action.

Applicants argued that the application as originally filed, and in particular the description of the microstrip antenna MSA 4 on page 6, lines 27-30 in conjunction with the description of Fig. 2 on page 1, lines 15-18 supports the claim limitation of a "plate antenna including a discoidal

electrode to which Ultra High Frequency is applied, an earth electrode and a dielectric plate provided between the discoidal electrode and the earth electrode". In the final Office Action, in the "Response to Arguments" section beginning on page 7 of the Office Action, the Examiner states:

> Applicant cites page 6, lines 27-30 of the instant application, as well as page 1 with reference to figure 2 of the instant application, as support for such limitation. However, the Examiner kindly disagrees since the specification, as originally filed, does not provide support in page 6, lines 27-30 for the instant limitation. Furthermore, it should be noted that: (a) page 1 of the instant application describes the apparatus of the prior art (fig. 2); (b) the discoidal electrode known in figure 2 (prior art) does not necessarily have to be the same as reference number 1, as shown in figure 1 (the instant invention); (c) one of ordinary skill in the art would not realize that the discoidal electrode of figure 2 (prior art) is the same as the discoidal of figure 1 (the instant invention); (d) there is no disclosure in the specification, as originally filed, that the discoidal electrode of figures 1 and 2 are the same.

Appellants refer to page 6, lines 23-30 of the specification as follows:

> The one point is MSA4, in order that axisymmetric TM01 mode like figure 3 can resonate, **frequency of the UHF wave which applies in discoidal electrode 3**, diameter of discoidal electrodes 3, **material of**

> **dielectric disk 2** and thickness are set. In this embodiment, the frequency of UHF wave was 450MHz, diameter of discoidal electrodes 3 was 255mm, and the alumina of the 20mm thickness was used as dielectrics 2. [Emphasis added.]

Appellants respectfully assert that the foregoing passage supports the limitation of the plate antenna having a discoidal electrode (3) to which Ultra High Frequency is applied and a dielectric plate (2). At issue is whether the application as originally filed conveys to one having ordinary skill in the art that the electrode 1 shown in Fig. 1 is an earth electrode. Appellants note that Fig. 1 shows an MSA 4 having elements 2 and 3 that are clearly equivalent to the elements 2 and 3 of the MSA shown in Fig. 2 and described on page 1 of the specification as follows:

> Laid Open No. 8-337887 disclosed, as shown in figures 2, the microstrip antenna ( MSA ) comprising a discoidal electrode 1 which was grounded, dielectric 2, and a high frequency discoidal electrodes 3 installed to face discoidal electrode 1 through a dielectric.

Accordingly, one having ordinary skill in the art to which the invention pertains would realize that the electrode 1 in Fig. 1 is part of an MSA structure having a grounded electrode, dielectric and electrode to which UHF is applied,

since the basic structure of an MSA is explained with respect to the prior art figure (Fig. 2).

The position set forth in the final Office Action is that Appellants have claimed an explicit limitation that is not present in the written description. However, the written description requirement is separate from the enablement requirement of 35 U.S.C. §112. It is not necessary that the claimed subject matter be described identically, but rather that the originally filed disclosure convey to those skilled in the art that appellant had invented the subject matter now claimed. Just how close the original description must come to comply with the description requirement is determined on a case by case basis. In re Barker, 194 USPQ 470 (CCPA 1977), Barker v. Parker, 197 USPQ 271 (1978), In re Wilder, 222 USPQ 369 (Fed. Cir. 1984), Wilder v. Mossinghoff, 105 S. Ct. 1173 (1985).

Appellants respectfully assert that there is a reasonable basis for finding that the microstrip (MSA) structure shown in figure 2 is a teaching of the invention that carries over to figure 3. Appellants comply with their duty of disclosure by disclosing that a micro strip antenna is known in the prior art, and specifically by citing Japan laid open-8-337887 as an example. Appellants note that the description of the micro strip antenna in figure 2 is not a reprint of any figure from the Japan laid-open application number. That is, Fig. 2 is drawn by Appellants with the discussion in the specification

that the content of Fig. 2 is known from the prior art reference Japan Laid-Open No. 8-337887. Figure 2 is a description of a MSA that Appellants identify as being within the prior art.

Appellants refer to the MSA in the stated purposes of the invention. For example, the first purpose (objective) of the invention is to provide an effective magnetic field plasma generator that is achieved with a plasma that is formed by ECR resonance of (1) electromagnetic wave which the antenna (MSA) radiates by supplying the MSA through the separation board outside the vacuum chamber UHF of not less than 300 MHz and not more than 1 GHz. See page 2, lines 27-31. Further, in the second purpose (objective) of the invention, Appellants state that the discharge characteristic as the frequency applied under 0.5Pa in the MSA changes, as shown in figure 5. See page 3, lines 9-10 of the specification. Additionally, the brief description of the drawings set forth by Appellants state that "Fig. 2 shows the micro strip antenna (MSA) structure". Accordingly, Appellants refer to an MSA throughout the specification and one having ordinary skill in the art would conclude that the basic structure of the MSA is the one described in Fig. 2. A further description of the MSA in relation to Fig. 1 and elsewhere would be redundant since the same reference numbers were used in all of the figures to describe the basic structure of the antenna including a discoidal electrode (3) to which Ultra High Frequency is

applied, an earth electrode (1) and a dielectric plate (2) provided between the discoidal electrode and the earth electrode. One of ordinary skill would expect to find an additional explanation of the MSA only if elements 1, 2 and 3 were intended to be different for each figure.

There is no reason provided by the Examiner to suggest to one having ordinary skill in the art that the elements 1, 2 and 3 shown in figure 1 are not the same as those shown in figure 2, other than the admission by applicants that figure 2 is in the prior art. Accordingly, applicants are entitled to claim that the MSA includes a discoidal electrode to which UHF is applied, an earth electrode and a dielectric plate provide between the discoidal electrode and earth electrode. Therefore, rejection under 35 U.S.C. §112, first paragraph should be reversed.

**GROUND OF REJECTION B**

Claims 1-2, 4, 6, 8 and 34-36 are rejected as being unpatentable under 35 U.S.C. §103(a) over Yokogawa et al., EP 0,779,644A2. The final Office Action states:

> Yokogawa et al. shows the invention as claimed including an apparatus for treating a body comprising: a chamber 101; a sample holder 111 in said chamber designated to hold a wafer with a predetermined diameter; means 120 for introducing gas into said chamber; means for exhausting said gas in said chamber; a power supply 104 of ultra high frequency (500 MHz); a coil 102 located

outside the chamber; an electromagnetic wave radiation antenna 107 coupled to said power supply and installed in an atmosphere; wherein said antenna 107 is a plate antenna (see figs. 1-2 and col. 5-line 3 to col. 7-line 3). Additionally, note that the antenna of the apparatus of Yokogawa et al. includes a discoidal electrode 107 to which the Ultra High Frequency is applied, an earth electrode 105, and a dielectric plate 106 which is provided between the discoidal electrode and the earth electrode.

Yokogawa et al. is applied as above but fails to expressly disclose that the antenna is located in an atmosphere different than the low vacuum in which the exhausting means is located and that a separation means is located between both locations. However, Yokogawa et al. discloses an apparatus in which the antenna is located in such a claimed atmosphere, that can be readily manufactured and maintained (see fig. 12 and col. 16-line 15 to col. 17- line 10). Therefore, in view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of the embodiment disclosed in fig. 1, as to locate the antenna as shown in the embodiment of fig. 12 of Yokogawa et al., because in such a way the apparatus can be readily manufactured and maintained.

Regarding the diameter of the discoidal electrode being not less than that of the wafer, such limitation is directed to a method limitation instead of an apparatus limitation and since an apparatus is being claimed as the instant invention, the method teachings arc not considered to be the matter at hand since a variety of methods can be done with the apparatus. The method limitations are viewed as intended uses which do not further limit, and therefore, do not patentably

distinguish the claimed invention. The apparatus of Yokogawa et al. is capable of processing a wafer having a diameter less than the diameter of the discoidal electrode.

With respect to claim 4, official notice was taken with respect to the well known use of showerheads for uniform distribution of gases in the office action mailed 5/22/01, and therefore this limitation is taken to be admitted prior art.

With respect to the claimed distance between the showerhead and the substrate holier, such limitation is considered to involve routine optimization which has been held to be within the level of ordinary skill in the art. Therefore, one of ordinary skill in the art at the time the invention was made would have modified Yokogawa et al. by having a distance between the gas introduction means and the substrate holder of 100 mm in order to optimize the apparatus and the process being performed in the apparatus.

Furthermore, Yokogowa et al. states that the size of the circular conductive plate is set to a diameter in which a specific resonance mode of the electromagnetic wave can be obtained (col. 5, lines 33-36). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the size of the conductive plate as to obtain the desired claimed resonance mode of electromagnetic waves, as to optimize the apparatus and/or the process performed in the apparatus.

Appellants agree that the Yokogawa apparatus is similar to that which is claimed in claims 1 and 34, however, Yokogawa fails to disclose the antenna as claimed, which includes the

discoidal electrode to which ultra high frequency is applied, an earth electrode and a dielectric plate provided between the discoidal electrode and the earth electrode. Further, Yokogawa discloses a discoidal electrode 107 to which the ultra high frequency is applied that is less than that of the diameter of the wafer to be treated, as shown in Fig. 1 of the reference. This are both significant differences between the subject matter claimed and that which is disclosed by the reference.

The specification states that for MSA 4, in order that axisymmetric TM01 mode like figure 3 can resonate, the frequency of the UHF wave which is applied to discoidal electrode 3, the diameter of the discoidal electrode 3, the material of the dielectric disk 2 and thickness are set. In the preferred embodiment, the frequency of the UHF waves were set to 450MHz, the diameter of the discoidal electrode 3 was set to 255mm, which is greater than that of the diameter of the wafer (200 mm) and the alumina dielectric was set at a 20mm thickness. Accordingly, the relationship between the diameter of the discoidal electrode of the MSA and the diameter of the wafer is significant to attaining the TM01 resonance. See page 6, lines 23-25 of the specification. It is an object of the invention to achieve the state in which there is no instability of the plasma by the transposition between modes, as there is in the prior art. See page 2, lines 31-34 of the specification. These aspects of the

invention are not disclosed or suggested to one having ordinary skill in the art by Yokogawa et al.

To the extent that Appellants' invention allegedly is obvious, it could only be obvious when viewed with the hindsight of Appellants' teachings and would require a reconstruction of Yokogawa to arrive at Appellants' invention. Yokogawa does not suggest etching a wafer that is larger than the sample holder, which would be required in order to meet the limitation of Appellants' claims 1 and 34. The Office Action states (*see* page 9) that this limitation

> ... has no patentable weight since the limitation is directed to a method limitation instead of an apparatus limitation and since an apparatus is being claimed as the instant invention, the method teachings are not considered to be the matter at hand since a variety of methods can be done with the apparatus. The method limitations are viewed as intended uses that do not further limit, and therefore, do not patentably distinguish the claimed invention. The apparatus of Yokogawa et al. is capable of processing a wafer having a diameter of less that the diameter of the discoidal electrode.

Yokogawa does not disclose the claimed relationship between the wafer diameter size and discoidal electrode diameter in Fig. 1, wherein the diameter of the discoidal electrode is less than that of the sample 110. In the second embodiment of Yokogawa (Fig. 5), the plate 208 is not equivalent to that of the invention since it is supplied with

two feed points 204 and 204' and therefore the embodiment is directed to providing electromagnetic waves with their phases shifted by 90°. Further, the excitation is achieved in the TM11 mode. Accordingly, it is submitted that claims 1-2, 4, 6, 8 and 34-36 patentably distinguish over Yokogawa et al.

Separate Patentability Of Claim 8

Claim 8 includes that the separation plate separates the chamber to provide a second area where the pressure is higher than the pressure in the chamber and that the antenna is a microstrip antenna formed in the second area. Fig. 12 of Yokogawa is relied upon for disclosing an airtight quartz window 607 that separates the radial strip line 606 from the vacuum chamber 616, however, the antenna is not a plate antenna in this embodiment. Further, claim 8 includes that the plate antenna resonates in TM01 mode. The Yokogawa reference does not disclose resonance in the TM01 mode, rather only resonance in the TM11 mode (see col. 5, lines 33-44 of the reference. Accordingly, it is submitted that claim 8 is separately patentably distinguishable over Yokogawa et al.

**GROUND OF REJECTION C**

Claims 9 and 37-38 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Yokogawa et al. in view of Nakano et al., U.S. Patent No. 6,155,202. The Office Action states:

> Yokogawa et al. is applied as above but does not expressly disclose that the power supply is provided in the form of a cone, but it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Yokogawa et al. as to provide the power supply in the form of a cone because, as disclosed by Nakano et al., better power consumption efficiency and optimization of the film being formed results (see col. 11-lines 40-45 and fig. 16 and its description).

Claim 9 depends from claim 37. Claims 37 and 38 include a conical-shaped feed division that is placed on the discoidal electrode. The conical-shaped feed division 11 is shown in Fig. 1, for example, and is not disclosed in Yokogawa or the remainder of the art of record. Although the Examiner relies upon Nakano for disclosing a conical shaped electrode, the electrode disclosed by Nakano is used in an apparatus placed in a vacuum, unlike the claimed feed division of claims 37 and 38. Accordingly, claims 9, 37 and 38 are patentable over Yokogawa in view of Nakano et al. Therefore, the 35 U.S.C. § 103(a) rejection should be reversed.

**GROUND OF REJECTION D**

Claims 39 and 40 stand rejected under 35 U.S.C. §103 as being unpatentable over Yokogawa et al. in view of Lee et al., U.S. Patent No. 6,009,830 or Fairburn et al., U.S. Patent No. 5,614,055. The Office Action states:

Yokogawa et al. is applied as above but does not expressly disclose the use of a gas shower plate which its diameter is less than or equal to ¾ of the diameter of the wafer. Li et al. discloses an apparatus in which a gas shower plate is used as the gas introducing means. Furthermore, the reference clearly discloses that the showerhead is smaller in diameter than the wafer being processed (see, for example, figs. 1-2, and their descriptions, and col. 3, lines 43-50). Additionally, Fairbairn et al. discloses an apparatus in which a gas shower plate is used as the gas introducing means, wherein the shower plate is smaller in diameter than the wafer being processed (see, for example, fig. 4 and its description). Therefore, in view of these disclosures, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Yokogawa et al. as to comprise a shower plate, as taught by Li et al. or Fairbairn et al., because in such a way the gas is uniformly distributed into the apparatus and it is more efficiently and effectively directed and concentrated towards the wafer being processed. Furthermore, the limitation of the gas shower plate having a diameter less than or equal to ¾ of the diameter of the wafer, is directed to a method limitation instead of an apparatus limitation and since an apparatus is being claimed as the instant invention, the method teachings are not considered to be the matter at hand, since a variety of methods can be done with the apparatus. The method limitations are viewed as intended uses which do not further limit, and therefore do not patentably distinguish the claimed invention. The apparatus of Yokogawa et al. modified by Li et al. or Fairbairn et al. is capable of processing a wafer having a diameter bigger than the shower plate, as claimed.

The significance of the limitation of claims 39 and 40 is based on Appellants' determination of a problem in which CD gain of the central pattern of the plasma etching increases in comparison with the pattern of the circumference in the etching condition of the prior art apparatuses whose distance between shower plate and support is not less than 100mm. And the shower plate diameter shown in figure 1 was also an important factor to achieve this effect. There is no effect when the shower plate diameter is 170mm. The effect of the CD gain reduction appears when shower plate diameter is 150mm or less in which the shower plate diameter becomes 3/4 of the wafer diameter. For a shower plate diameter of 100mm, the distance between the sample and shower plate had to be shortened to 60mm so that the processing could be carried out without the in-plane difference of the CD gain. These aspects of the invention are not disclosed or appreciated by Li et al. or Fairbairn et al. Accordingly, it is submitted that the Examiner has not established a prima facie case of obviousness.

## 8. CONCLUSION

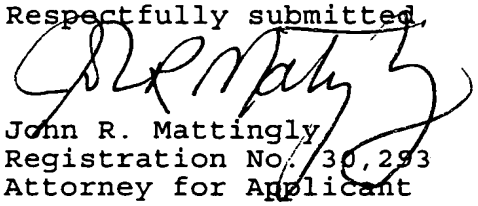
For the foregoing reasons, the Applicant respectfully submits that the rejection of the claims on appeal should be reversed and the application allowed.

**9. FEES**

A credit card payment is attached in the amount of the appropriate fees in support of the appeal.

If any further fees are due in connection with the filing of this Appeal Brief, including any Extension of Time fees that are necessary, the Commissioner is hereby authorized to charge deposit Account No. 50-1417.

Respectfully submitted,



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Date: October 6, 2005

CLAIMS APPENDIX

1. A dry etching apparatus for treating a body comprising:

a chamber;

a sample holder in said chamber designated to hold a wafer with a predetermined diameter;

means for introducing gas into said chamber;

means for exhausting said gas in said chamber;

a power supply of Ultra High Frequency;

an electromagnetic wave radiation antenna coupled to said power supply and installed in an atmosphere; and

a separation plate used as dielectric between said antenna and the inside of said chamber, wherein

said antenna is a plate antenna including a discoidal electrode to which Ultra High Frequency is applied, an earth electrode and a dielectric plate provided between the discoidal electrode and the earth electrode,

wherein a diameter of said discoidal electrode is not less than that of the wafer.

2. A dry etching apparatus according to claim 1, wherein said separation plate is quartz disk.

4. A dry etching apparatus according to claim 1,

wherein said means for introducing the gas has a shower plate, and

a distance between said shower plate and said holder is less than 100mm.

6. A dry etching apparatus according to claim 1,

wherein said power supplies Ultra High Frequency of a frequency not less than 300MHz and not more than 1GHz.

8. A dry etching apparatus according to claim 1,

wherein said separation plate separates said chamber and a second area where the pressure is higher than the pressure in the chamber,

said antenna is a microstrip antenna formed in said second area;

a coil outside of said chamber; and

wherein the plate antenna resonates TM01 mode.

9. A dry etching apparatus according to claim 37,

wherein said separation plate separates said chamber and a second area where the pressure is higher than the pressure in said chamber,

said antenna is a microstrip antenna formed in said second area;

a coil outside of said chamber; and

wherein a power supply provides Ultra High Frequency power to said plate antenna in a form of a cone.

34. A dry etching apparatus for treating a semiconductor wafer comprising:

a chamber;

a holder in said chamber designated to receive a semiconductor wafer of a predetermined diameter;

means for exhausting said gas in said chamber;

means for introducing gas into said chamber;

a power supply of Ultra High Frequency;

a plate antenna for radiating an electromagnetic wave, coupled to said power supply and installed in an atmosphere, said microstrip antenna comprising a discoidal electrode; and

a separation plate used as a dielectric between said antenna and the inside of said chamber;

wherein said plate antennae is including a discoidal electrode to which Ultra High Frequency is applied, an earth electrode and a dielectric plate provided between the discoidal electrode and the earth electrode,

wherein a diameter of said discoidal electrode is not less than that of the wafer.

35. A dry etching apparatus according to claim 34, wherein said separation plate is a quartz disk.

36. A dry etching apparatus according to claim 34, wherein said power supply supplies power of an Ultra High Frequency band having a frequency not less than 300MHz and not more than 1GHz.

37. A dry etching apparatus according to claim 1, further comprising:

a conical-shaped feed division to provide Ultra High Frequency power to said plate antenna, wherein

said conical-shaped feed division is placed on the discoidal electrode, and

said feed division is placed in the atmosphere.

38. A dry etching apparatus according to claim 34, further comprising:

a conical-shaped feed division to provide Ultra High Frequency power to said plate antenna, wherein

said conical-shaped feed division is placed on the discoidal electrode, and

said feed division is placed in the atmosphere.

39. A dry etching apparatus according to claim 1, said means for introducing gas further comprising:

a gas shower plate which its diameter is less than or equal to three fourths of the diameter of the wafer.

40. A dry etching apparatus according to claim 34, said means for introducing gas further comprising:

a gas shower plate which its diameter is less than or equal to three fourths of diameter of the wafer.

# EVIDENCE APPENDIX

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# RELATED PROCEEDINGS APPENDIX

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